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THE DEVELOPMENT OF SOIL SCIENCE

A. G. McCall

The convening of the First International Congress of Soil Science at Washington in 1927 constitutes a milestone in the development of soil science. This Congress was called as the result of a series of international gatherings of soil scientists, the first of which was held at Budapest, Hungary, in 1909, under the patronage of the Royal Minister of Agriculture. A year later a second conference was held at Stockholm, Sweden, at the close of which it was decided that a third conference would be held at Saint Petersburg in 1914. The period immediately following the conference at Stockholm was characterized by an active interest in the work and the organization of commissions charged with the responsibility for the development of the program for the Saint Petersburg meeting. The gathering war clouds, however, prevented holding of the projected conference in Russia and it was not until the summer of 1921 that steps were taken looking to the resumption of these friendly scientific conferences that had been rudely interrupted by the World War. As a result of these preliminary negotiations the third soil conference met at Prague, Czechoslovakia, in 1922. This conference has the distinction of being the first post-war international gathering of scientists. Two years later a Fourth International Conference was held at Rome under the patronage of the King of Italy and the direct auspices of the International Institute of Agriculture. On the last day of the Rome conference final plans were consummated for the formal organization of an International Society of Soil Science the objects of which were to be the promotion of Soil Science by the holding of conferences and meetings, the formation of commissions and sections and the publication of a journal.

At this meeting Doctor J. G. Lipman, Director of the New Jersey Agricultural Experiment Station, was elected President and the following commissions were organized: 1, Soil Physics (Prof. Václav Novák, Highschool for Agriculture, Brno, Czechoslovakia); 2, Soil Chemistry (Prof. Alexius A. J. de'Sigmond, Royal Joseph Hungarian University of Technical Sciences, Budapest); 3, Soil Bacteriology (Prof. Julius Stoklasa, Czechoslovak Academy of Agriculture, Praha); 4, Soil Fertility (Prof. Eilh. Alfred Mitscherlich, Agricultural Institute of the University of Königsberg, Königsberg); 5, Nomenclature, Classification and Mapping of Soils (Dr. C. F. Marbut, United States Department of Agriculture, Washington, D. C.); 6, Application of Soil Science to Agricultural Technology (Dr. Jean Girsberger, Zurich).

With the scope of the organization materially enlarged, it was decided to issue a call for the assemblage of the First International Congress of Soil Science at Washington in 1927. At the same time Doctor Lipman was authorized to form an American Organizing Committee and soon after the adjournment of the Rome Conference, preparations were made to organize the committee under the auspices of the American Society of Agronomy. The official coöperation of the United States Government was secured through the United States Department of Agriculture and by a Joint Resolution of Congress which authorized the President of the United States to extend invitations to the nations of the world to send official delegates. The First International Congress of Soil Science therefore was the result of the coöperative efforts of the International Society of Soil Science, the American Society of Agronomy, and the United States Government.

I have briefly sketched this latest step in the development of soil science in order to raise the question as to why recognition of this science has been so long delayed.

The origin of soil science like many other of the sciences is to be found among the ancient peoples. Seven centuries before the dawn of the Christian era soil descriptions were already in existence. The collection of facts of observation about the soil doubtless began with man's first attempts to utilize this natural resource for the production of crops. The early references that

are to be found in the works of ancient writers such as Cato, Varro and Columella deal with the utilization of the soil. Columella attempted to determine the quality of the soil by studying experimentally the sweetness and fatness of plants growing upon it. Cato classified soils not on the basis of their characteristics but upon their capacities for the production of certain plants. Scientific curiosity concerning the characteristics of the soil itself was not manifest until after the beginning of the nineteenth century and even then there was no close agreement among investigators as to what knowledge of the soil was of practical value and what was without such value. A search of the literature reveals an almost complete lack of improvements of any kind in agriculture in western continental Europe from the time of the fall of Rome to the close of the eighteenth century.

As early as the seventeenth century investigators began the search for a "principle" of vegetation to account for the then known facts of plant growth and soil fertility. Van Helmont was convinced by his famous Brussels experiment that this "principle" was to be found in water. The published report of his experiment reads as follows:

"I took an earthen vessel in which I put 200 pounds of soil dried in an oven, then I moistened with rain water and pressed hard into it a shoot of willow weighing 5 pounds. After exactly five years the tree that had grown up weighed 169 pounds and about 3 ounces. But the vessel had never received anything but rain water or distilled water to moisten the soil when this was necessary, and it had remained full of soil which was still tightly packed, and lest any dust from outside should get into the soil, it was covered with a sheet of iron coated with tin but perforated with many holes. I did not take the weight of the leaves that fell in the autumn. At the end I dried the soil once more and got the same 200 pounds that I started with, less about 2 ounces. Therefore the 164 pounds of wood, bark, and root, arose from the water alone."

The foregoing is a good example of how incorrect conclusions may be drawn from sound experimental data. Two important dormant factors were overlooked by Van Helmont—the parts played by the air and the missing 2 ounces of soil. During the period immediately following the publication of Van Helmont's experimental results several other workers sought for the source of this "principle" and set up hypotheses as the result of their

observations of the effect upon the soil of the addition of various substances.

In 1727 Boerhaave published a text-book on chemistry in which he taught that plants absorb the juices of the earth and work them up into food. Three years later Jethro Tull published his *The Horse Hoeing Industry* in which he discussed in most picturesque language the sources of fertility of the soil. In his view it was not the juices of the earth, but the very minute particles of soil that furnished the growth substance for plants. The pressure caused by the swelling of the growing roots forced the fine particles into the "lacteal mouths of the roots" where they entered the circulatory system. All plants took in these particles and thus lived on the same kind of food. It was incorrect therefore to assume as some had done, that different plants required different foods as was the case with horses and dogs, but that plants took in anything that came their way, good or bad.

By the middle of the eighteenth century inquiries into the relationship of the soil to plant growth had been pushed as far as the methods in use would permit and consequently no marked advance was made during the last half of the century. During this period, however, work was in progress by Priestly and others on the effect of growing plants on the air, that was destined to revolutionize the then prevailing ideas of the relationship between plants and soil. In 1804 de Saussure published the results of his researches in which he introduced the quantitative statistical methods which later formed the basis for the work of Boussingault, Liebig, Lawes and Gilbert and many others in the same field. In addition to his demonstrations of the central facts of plant respiration, de Saussure drew from his experimental data the conclusion that the soil furnished only a very small but at the same time indispensable part of the plant food. His teachings, however, were not readily accepted nor were his methods followed by his contemporaries.

Up to the close of the first third of the nineteenth century experiments had been conducted either in the laboratory or in small pots. About 1834 Boussingault began a series of experiments on his farm in Alsace. He adopted the quantitative methods of

de Saussure, weighed and analyzed the manures used and the crops produced on his plots; and at the end of the rotation drew up a balance sheet in which he sought to show how far the manure had satisfied the needs of the crop and to what extent other sources of supply such as the air, rain, and soil, had been drawn upon to nourish the plants.

During the decade from 1830 to 1840 Sprengel was determining the ash constituents of plants, Schubler was studying the physics of the soil and much other work was in progress. During this period no outstanding discoveries were made, no controversies were in progress and no great amount of interest was taken in the study of plant growth and soils.

This condition was entirely changed in 1840 when Liebig made his classical report to the British Association upon the state of organic chemistry, which came as a thunderbolt out of a clear sky so far as the world of science was concerned. With a fine display of sarcasm he held up to scorn the plant physiologists of his day for their continued adhesion to the theory that plants derived their carbon dioxide from the soil and not from the air. Liebig expressed his ridicule in the following language:

"All explanations of chemists must remain without fruit, and useless, because even to the great leaders in physiology, carbonic acid, ammonia, acids and bases are sounds without meaning, words without sense, terms of an unknown language, which awaken no thoughts and no associations. The experiments quoted by the physiologists in support of their view, are all valueless for the decision of any question. These experiments are considered by them as convincing proofs, whilst they are fitted only to awaken pity."

This report was afterwards published in book form under the title *Chemistry in Its Application to Agriculture and Physiology*. It went through several editions and as time went on Liebig developed his Law of the Minimum which he expressed as follows: "by the deficiency or absence of *one* necessary constituent, all others being present, the soil is rendered barren for all of those crops to the life of which *that one* constituent is indispensable." As a result of his laboratory studies and field observations Liebig became convinced that if supplied with alkalis and phosphates, plants might depend upon the atmosphere for their supply of

nitrogen. When taken to the field, his patent manure failed and finally his mineral theory of plant nutrition was thrown into disfavor by the results secured at the Rothamsted Station. Although many of Liebig's statements were wrong, and in spite of the fact that his patent manure failed to give satisfactory results in the field tests, the main outline of his theory still stands and soil scientists are indebted to him for his pioneer work in the field of soil chemistry and plant nutrition. The stimulus of his work can scarcely be overestimated and before he had retired from the arena the essential facts of plant nutrition had been settled and lines were laid down along which scientific fertilization of crops was to be developed. The controversy, however, continued for many years. Farmers were slow to believe that chemical manures could ever do more than stimulate the crop and were strong in their conviction that their continued use must ultimately exhaust the soil. In the meantime Lawes had developed his phosphate patents and inaugurated the field plot work at his Rothamsted estate, which has been under continuous observation even to the present moment.

Thanks to the labors of Liebig and of his predecessors and successors, the study of the chemical composition of the soil and of the ash content of plants has led to the development of the great commercial fertilizer industry of the present day, based largely upon recognition of the fact that of the elements essential to plant growth, the normal soil furnishes all except nitrogen, phosphorus and potassium, which are sometimes designated as the golden tripod upon which the successful production of agricultural crops must ultimately depend. In recent years it has been found that certain rare elements normally present in the soil in very small amounts are essential to the successful production of crop plants on certain soil types. Recent scientific research has served to dissipate many false notions regarding the function of the soil and to expand our knowledge of the sources of supply of carbon and nitrogen and the rôle played by the organic matter constituents of the soil. Investigation of the physics of the soil has led to the development of methods of mechanical analysis and for the determination of soil structure and consistence which are useful in the fundamental classification of soils.

As a result of the marvelous accomplishments of chemistry in other industrial fields, there has been developed the expectation that some happy day chemical workers will devise some system of soil examination and analysis which might be used to determine in the laboratory not only the adaptability of the soil to crops, but also what and how much fertilizer must be added to a given soil to secure maximum productivity. Unhappily even the magic of chemistry has its limitations and such hopes have not been realized except to a very limited extent.

Time will not permit even a brief review of the more recent developments in the realm of soil productivity. In closing this part of the discussion attention should be called to the fact that there still remain many unsolved problems of soil productivity to challenge the ingenuity and fire the imagination of students of soil chemistry and soil physics. There are doubtless in the discoveries of the future many that may compare in value with the discovery of the fact that the use of a few pounds of manganese sulfate, copper sulfate or some of the other so-called rare elements, spells the difference between crop failure and crop success on some of the soils of Florida. The quantities of these materials applied are so infinitesimal compared with the quantity of soil affected that the results savor strongly of magic.

In spite of all that has been written about Liebig's work he should not be classed as a soil investigator. He made no attempt to define the nature of soils but contented himself with the study of the chemistry of the soil materials, and a discussion of what was necessary in the soil for the production of crop plants. He did not undertake to group, define and study soils as such on the basis of their various constituents which he defined as plant foods.

It is only within recent years that the study of soils has been recognized as a distinct science to be pursued without reference to questions that concern the getting of immediate results in increased crop yields. The great landholders of Rome, particularly those living in Italy, took a lively interest in soils and made some crude attempts at studying them to an extent sufficient to permit of some sort of rough classification. Their grouping was based mainly on texture, certain areas being designated as clay

or fat lands and others as sandy or lean lands. Their work, however, cannot be considered as any real conscious soil research although they learned by experience a great deal regarding the use of manures and the importance of growing legumes. From the time of the Romans or through the whole of the Middle Ages there appears to be a complete absence of any records of soil investigations until the close of the eighteenth century.

Working mainly in western central or northern Germany during the last decade of the 18th century and the first two decades of the 19th century, Thaer studied the region sufficiently to enable him to attempt the classification of the land not on the character of the soil but rather on the basis of the crop to which the soil was best adapted. He was among the earliest and one of the most thorough of the early German students of agriculture and, on the basis of the kind of crop which experience showed did best, he classified the soils of the different holdings into wheat soils, rye soils, grass soils and potato soils. The Germans continued to use Thaer's definitions and classifications until within the last few decades. By the middle of the 18th century the French and the English began to define their soils in terms of geological formations from which the material had been derived and this kind of soil definition and type of soil study was practically the only kind of soil investigation as far as field soils are concerned, that had been attempted either in Europe or the United States until after the close of the 19th century.

Real soil investigations carried on as a purely scientific enterprise and without reference to soil fertility and crops originated about 1870 in Russia. The Russian work has had a very profound influence upon the development of soil science not only in Europe but in this country and throughout the entire scientific world. As a result of the existence in Russia of vast areas of virgin soil covering a wide range of climatic influences and topographic features, their soil scientists have had an unusual opportunity to study genesis, morphology and classification whereas the workers of western Europe have had a very restricted range of virgin soil. They early accepted the genesis of their soils as the basis for their descriptions and system of classification. It was

their conception that the materials from which the soils had developed is, in most cases, much less important than the powerful influence of climatic factors and the character of the vegetation. Foremost among the Russian soil workers of the last quarter of the 19th century was Professor Dokuchaiev who may be justly regarded as the founder of soil science in Russia. The fundamental principles which he laid down were published during the five-year period directly following 1879. His cardinal principle that the character of the soil is largely dependent upon its geographic position and climatic environment rather than upon the character of the rock from which it was derived, was the result of his personal observations on the distribution of soils over a great extent of the surface of European Russia. Dokuchaiev pointed out that the effect of climate on soil-forming processes influenced the type of flora, the annual accumulation of vegetable matter, the rate of decomposition of plant remains on the surface as well as in the soil and finally the reactive character of the decomposition process. "Take for example," he writes, "several areas with uniform soil and sub-soil, uniform relief and uniform age and allow them to be covered within the same time with the same kind of plant cover. Place one of them in a part of Russia where the rainfall is low, the summer long and the winter short, where the vegetation process is energetic but slow, where the mud is dry and in two or three days all streams dry up, the vegetation dies, where forests are absent, where surface streams are few and evaporation is rapid. Place the other area in a part of Russia which has an excess of moisture, cool short summers, winters lasting from six to seven months, the summers from three to four months, the evaporation small, the soil more or less wet permanently, and where forests and swamps exist. Place a third area in that part of Russia where the existing climatic conditions are intermediate between those of the two areas already cited." That the same soil could develop under such widely different conditions he declared to be impossible. In this connection it is of interest to recall the fact that our own Bureau of Soils originated as a branch within the Weather Bureau. Because of the demand for information regarding the relation of soils to meteor-

ological conditions the Division of Soils was organized in 1894 as a part of the Weather Bureau but became an independent division of the Department of Agriculture the following year, and in 1901 the soil work was organized as an independent bureau, with Milton Whitney, who had been in charge of the work since its inauguration, as its chief. It should be stated, however, that the work of the Russian soil scientists had very little if any influence upon the shaping of the early work of the Bureau of Soils, because of the fact that our scientists did not have ready access to the Russian reports because of the language difficulty. Of late years the work of the Russian scientists has become readily accessible through the translation of their papers into the German and more recently into the English language. Time will not permit a discussion of the various ways in which not only the scientific thought of this country but of western Europe as well, has been influenced within the last two decades by the writings of Russian pedologists. The vast extent of our soil areas and the general similarity between soil conditions in this country and Russia has made their results particularly applicable to our work in the classification and mapping of soils. The translation into German and finally into English, of Glinka's book *The Great Soil Groups of the World and Their Development* has had a very profound influence upon the development of the study of the genesis, morphology and classification of soils in the United States.

The present work of soil classification in the Bureau of Chemistry and Soils is based upon the conception that soils like plants and animals are natural bodies and like them are identified as individuals by their characteristics. The plant covering which mantles the surface of the earth is made up of individuals that are physically distinct and separated geographically each from the other. The soil cover differs from the plant cover in that the individual soil bodies are not separate and physically distinct, but, like geological formations grade the one into the other. It is only within the last half century that men have been engaged in the work of actually studying soils in their natural habitat and determining their characteristics, so that any earlier at-

tempts at differentiation and definition into individual bodies must have been of necessity based on something other than natural characteristics. Literature is replete with references to the attempts of the earlier workers in soil science to define and classify soils on the basis of their relationships to other natural bodies with which they are associated. Up to within a few years ago, and in many cases up to the present time, systems of classification are in use, in which the attempt is made to differentiate soil groups upon the characteristics of the geological materials from which the soil has been derived. This was a more or less logical procedure since it was a matter of common knowledge that soils had been developed from geological formations or materials derived from such formations. The errors involved in this procedure were not discovered until a considerable amount of actual soil knowledge had been accumulated. When this was done through a study of the soils themselves it became apparent, for example, that a soil overlying granite and undoubtedly developed from granitic material in New Jersey was entirely different in its characteristics from a soil derived from granitic material in Georgia, or in southern California. This error was not discovered by American workers until less than two decades ago. When it was first discovered our soil investigators were at a loss to find a substitute for the old teachings until the work of Russian soil scientists became accessible. The application of their methods of observation, and study of different horizons of the soil profile, has not only enabled the soil scientist to study the chemical changes produced by weathering, but also to observe the effect of vertical internal erosion by which the products of weathering in one horizon are carried away to become an integral part of another layer or horizon. Thus certain horizons are constantly being depleted of their original constituents while others are being changed and enriched by the influx of foreign materials resulting from chemical action and physical degradation.

It was shown that the general features of the dominant soils in regions of at least smooth surface where agriculture was possible, varied with the characteristics of the climate. That is, within any given region where the climate is uniform the domi-

nant general soil characteristics are uniform, but in regions having widely different climatic features the soils are widely different. A map showing the distribution of different kinds of soils defined on the basis of their broad general characteristics when superimposed over a map showing the distribution of different kinds of climate indicates a very close correspondence between the two. This was especially the case in Europe.

Investigations in this country show, however, that another factor than climate is highly important in producing even the broad characteristics of soils. This is the natural vegetation. While the Russian work took into consideration the general character of the natural vegetation, yet its importance as a dynamic factor in the development of soil characteristics was not brought out. It happens that conditions in this country are such as to show the importance of this factor. A closer study of soils shows also that within any given region where the climate is uniform the soils are by no means uniform in detail. While it is true that general characteristics of the soils are uniform, yet it is not true that all of their characteristics are uniform.

If we differentiate the soils of a region into mature and immature, we automatically differentiate them into those whose features are mainly due to climate and those due to other factors. Mature soils in any region are those that lie on a smooth surface where they have not been disturbed by rapid removal of their material by erosion, and where they have undoubtedly lain for a period of time long enough for the climate, as well also as the natural vegetation, to express itself.

Immature soils are due to several factors, but predominantly they are those lying on rather steep slopes, where there is continual removal of material from the surface by erosion and also an addition of material from the bottom of the soil through the decomposition of the rock lying beneath them. They occur also where there is removal of soil and redeposition of the material in creek and river valleys. Such soils have not lain in place long enough for the climate to have been effective. Lack of maturity in soils is a measure of the lack of adjustment to the climate and the natural vegetation of the region in which they lie. They

have not become adjusted to their environment, as the ultra-scientific evolutionist would doubtless express the matter. They in turn, however, are in progress of development and in time will become mature. This process of development is slow, however.

This fact, along with others that were discovered about the same time, makes it clear that soils can not be identified and defined entirely on the basis of the climate of the region in or the natural vegetation under which they have developed.

By the time, however, that this defect of the climatic grouping of soils was realized, sufficient actual soil knowledge, obtained by the study of soils in the field, had been accumulated to make it possible to define and therefore identify soils simply on the basis of their characteristics.

This basis of grouping on simple soil differences, these differences obtained in the study of soils both in the field and in the laboratory, is now the established basis on which soils are differentiated in the United States.

It has been found also that soil individuals, defined on the basis of differences in field characteristics, show corresponding differences in chemical and physical characteristics. These individuals we call soil types.

In concluding I wish to leave with you a brief summary of our present day thinking upon the subject of soil evolution. It is now quite generally recognized by students of soil science that the soils of the world are and have been subject to a process of evolution. Like all animal life and all plant life, they pass from youth to maturity and then on to old age. And the character of a soil, is determined in this progressive development, just as in animals and plant life, by the influences of heredity and environment.

This appears to be an instance of heredity and environment meeting as a single force, for the scientist refers to soil being "a product of its environment." We might conclude, in short, that in the case of soils, environment is hereditary. The dynamic factors of the environment, we are told, "consist of the forces residing in climate and organic life." So it happens that in the

formation of soil character the plant growth in a particular region is the determining factor. But that influence continues only until the soil has developed into maturity. As soon as it reaches its adult stage in evolution it reacts and to a certain extent begins to determine the character of the environment.

We may see in this a striking analogy to the relations of the human individual and his environment. Man is very largely shaped by environment and as soon as he achieves sufficient strength he reacts and becomes a definite influence in reshaping his environment. Now that we know that soil passes through a definite span of life from youth to old age it seems easier to understand why it is so difficult to raise certain plants on particular soils. The previous environment of the soil has developed a character that is inimical to those certain plants. When it becomes apparent that no plant life at all can survive there we can only conclude that the soil has found the ultimate answer to old age by succumbing to death.

But in the light of progressive scientific discoveries we find it impossible to believe that the "death" of soil is necessarily anything more than a stage of coma or suspended animation. Soil surveys are studies of the relationships of soil environments in which their evolution has occurred. Our faith in science is so profound that we believe in the possibility of resuscitating even a dead soil and who knows but that in the near future we may be able to treat dead soils and start them on a brand-new evolutionary course from youth to old age.

THE PROMOTION OF AGRICULTURE BY THE ILLINOIS CENTRAL RAILROAD, 1855-1870

PAUL WALLACE GATES

The significance of the work of the railroads in promoting agriculture in the United States cannot have escaped the attention of any well-read citizen of thirty years ago or of today. The departments of agriculture of the various roads have done a great deal to diversify crops, to improve the grade of stock, and to teach better methods of tilling and enriching the soil. Their exhibition cars of blooded stock have been seen in most communities of the west, where they have stimulated wide interest in stock improvement, and their displays of other farm products have likewise done much to diversify the crops of different sections of the country. The railroads are much more publicly minded today than they were even a generation ago, but their efforts to aid the farmers of the west are not wholly disinterested. They are undertaken for the purpose of building up the freight and passenger traffic of the roads by increasing at the same time the amount of farm produce going to market and the farmer's buying power. They are undertaken also with the idea of making the farmer more satisfied with his lot and less anxious to abandon the farm for the city. In other words, the railroads have come to realize that everything which benefits the farmer will directly or indirectly benefit them.

The credit for initiating this type of activity on the part of railroads has generally gone to James J. Hill, the promoter of the Great Northern Railroad. It is hoped in this article, however, to show that practically all of the kinds of work done by Hill was undertaken by the Illinois Central Railroad under the guidance of President William H. Osborn in the period from 1855 to 1870, or a full generation before Hill began his great work. It is not the purpose to detract from the honor which is due Hill for his

vision and foresight, but rather to show that, in his work to aid the farmers of the northwest, he was not initiating a unique policy but was enlarging upon the plans and ideas of Osborn and others associated with him in the Illinois Central.

In the decade of the 'fifties, the Illinois Central Railroad had a great stake in Illinois. This road had received a federal land grant of two and a half million acres along the line of its route to aid in its construction, and upon this grant it had secured its bonds. By 1856 it had completed a line of railroad 700 miles in length, most of which was constructed through a region sparsely settled. The road could not meet operating expenses until the surrounding territory had been developed sufficiently to furnish it with a large freight and passenger traffic and, in the meantime, it was dependent upon the income from its land sales. By 1857 a large body of settlers was living upon the company's land, most of whom had purchased their holdings upon liberal credit terms.¹ The welfare of the Company depended, therefore, to a very considerable extent upon the welfare of its settlers and upon the prosperity of the farmers whom its line served. Recognizing this situation, the officials of the Illinois Central, led by President Osborn, determined to assist the farmers by a broad program of agricultural promotion.

The first step in this direction was to assist the Illinois State Agricultural Society with its annual fairs. Reasoning that the dissemination of information concerning the agricultural possibilities of the State would not only assist the farmers but also would advertise the advantages of settling in Illinois, the officials of the Illinois Central determined, in 1855, to make the Chicago fair of that year a great success. They gave reduced rates to visitors and provided free transportation for "cattle, stock, produce, and specimen articles" intended for exhibition at the fair. They instructed the station agents to collect and forward to Chicago specimens of soil, wheat, coal and other minerals, grasses, and fruits found in the neighborhood. To win publicity for the fair as well as for the Illinois Central, the officials, acting

¹ Illinois Central Railroad, *Annual Reports*, 1853-1860. These Documents are indispensable for the social and economic history of Illinois from 1853 to 1870.

in coöperation with the State Agricultural Society, invited a large number of "eminent agriculturists," scientists, editors of rural and agricultural papers and officials of local agricultural societies to visit the fair and then to participate in an excursion over the entire line of the road. One hundred and fifty invitations were sent out to persons in twenty-four states. Although some of those invited were unable to attend, many interested in agriculture accepted this opportunity of seeing Illinois. They were royally entertained by the city of Chicago during the days of the fair and then were taken over the Illinois Central.² They were provided with literature and statistics by the Company and were generally encouraged to publish accounts of their experiences. Judging from the amount of publicity which this excursion received, its expense was well justified. Many of the agricultural weeklies and newspapers gave long descriptions of the fair, the excursion, and the crops and conditions in Illinois.³

The following year, the Illinois Central made an attempt to secure the state fair for southern Illinois. This region was being neglected by incoming settlers and it was believed that if the fair were taken there it would dispel the notion, widely propagated by Chicago papers, that "Egypt" was an infertile and sickly country. It was also felt that the location of the fair in southern Illinois would have a stimulating effect upon the settlers of the region by giving them a knowledge of new methods of farming and of the advantages of stock improvement. The Illinois Central subscribed \$2,000 to assist Jonesboro in securing the fair. Its efforts were unsuccessful, however: Alton rather than Jonesboro secured the coveted prize.⁴ Bitter feeling was aroused and threats were made to start a rival fair. Although the threats came to nothing, agitation continued for the location of the fair in Egypt proper and in 1858 success was attained. Centralia

² Illinois Central Railroad, *Annual Reports*, 1857, p. 836-847.

³ For examples see *Country Gentleman*, VI (1855), 320-321 which also quotes from the *Cincinnati Gazette*; *The Horticulturist* (1855), 536-537 and the account in the *Illinois Reports*, 1857, p. 777-788. See also the letters of B. F. Johnson to Perkins, dated Oct. 11 and 12, 1855, in the Magazine Office, Illinois Central Station, Chicago. The collection of material in this office is hereafter cited as M. O.

⁴ *Prairie Farmer*, Feb. 25, 1858.

defeated its rivals, Jacksonville, Freeport, and Peoria, which were bidding for the location.⁵

The Illinois Central was especially generous in its efforts to assist the State Agricultural Society in making a success of this fair. This was the first time the fair was held in Egypt proper and, without the coöperation of the railroad, Centralia, then only a small town, would have been unable to provide sufficient accommodations to care for the exhibits and the crowds of people. To meet the needs the Company volunteered to place at the disposal of the fair its large buildings in Centralia. It likewise furnished two and one-half miles of cars in its side-tracks to provide sleeping accommodations for the people who attended the fair. As in previous years, it transported exhibits, lumber and fixtures free of charge and ran free special trains for a distance of 100 miles north and south of Centralia during the exhibition to enable as many people as possible to attend.⁶ Such liberality was "unprecedented" as a resolution of the State Agricultural Society declared.⁷ These activities of the Illinois Central were helpful to the farmers of the State who, however, were soon to require more thoroughgoing assistance.

When the Panic of 1857 occurred, the farmers of Illinois were hard hit. With declining prices, partial or complete crop failures in 1858 and 1859 due to unseasonable frosts and rains, wheat rust, the chinch bug and other pests, the corn and wheat producers of Illinois suffered severely.⁸ The purchasers of Illinois Central land were now in a bad way. Many of them, with frontier op-

⁵ Illinois State Agricultural Society, *Transactions*, III (1857-58), 76.

⁶ *Illinois State Journal*, April 21, 28, 1858; *Prairie Farmer*, April 22, 29, 1858.

⁷ Illinois State Agricultural Society, *Transactions*, III, 98.

⁸ Doleful indeed were the letters from the agents of the McCormick Harvester Company to the Chicago officials concerning agricultural conditions. John B. Fairbanks, writing to C. H. McCormick from Springfield on June 27, 1858, said that the long continued rains, the rust, and the excessively hot weather had created a very alarming situation which made the "farmers wear sombre countenances." Another writer from Livingston County remarked about the bad wheat failure, saying the best piece of land in the vicinity yielded but seven bushels to the acre while the highest price offered was 28 cents per bushel (C. B. Ostrander to C. H. McCormick, Nov. 6, 1858, in McCormick Library). For a detailed discussion of the unfortunate economic situation see the report of J. W. Foster, land commissioner of the Illinois Central Railroad in its *Annual Report* for 1859.

timism, had purchased more land than they could reasonably hope to pay for or than they could cultivate, their purpose being to hold their land until the development of the State had enhanced its value. Between 1858 and 1860 the problem of making collections upon the contracts of delinquent purchasers became an extremely difficult one for the officials of the Illinois Central to handle. Without the income from land sales, the Company would have been unable to meet its obligations. It was therefore necessary for the Illinois Central to be firm towards the purchasers of its lands but at the same time to be tactful in order to avoid arousing their opposition. Frontiersmen, with their traditional opposition to monopoly, especially land monopoly, would have been easily aroused against the corporation had it pursued a rigorous policy of collection after 1857. The Company, therefore, anxious to avoid trouble, and aware that it was to its own interest to keep the farmers on the land, granted extension after extension to delinquent purchasers and gradually worked out a policy whereby farmers who found they had purchased too large an amount could relinquish part of their holdings while the payments they had made were applied in full on the part they retained.⁹

In 1860 and during the early months of 1861 conditions improved somewhat, but the outbreak of the Civil War, by cutting the trade routes with the South, closed the market for much of the produce of Illinois farms and made conditions temporarily worse than they had been in 1858 and 1859. Even in such an unfavorable year as 1859 over 350,000 bushels of grain, 27,000 barrels of flour, and a large quantity of beef, pork, and whiskey had been shipped to the South by the Illinois Central and probably a larger quantity of goods had gone to the same region by the Mississippi River. The loss of this market was not compensated for immediately by demands from the army and from Europe and prices fell disastrously. Thus from January 5 to December 28, 1861, corn fell from 30 cents to 23 cents per bushel at Chicago; No. 1 Spring Wheat fell from 80 cents to 69 cents;

⁹ The reports of the land commissioners in the *Illinois Central Railroad Annual Reports* for 1858-1864 discuss the problem of slow collections.

flour fell proportionately; and the Chicago quotations on hogs were practically halved during the period.¹⁰ Corn sold at Bloomington and Dixon at prices as low as 8 and 10 cents per bushel.¹¹ At these prices there was no profit for the farmer and corn was frequently burned for fuel. With such small returns from their crops it was impossible for the settlers to continue payments upon their contracts and collections declined alarmingly in 1861 and 1862.¹²

Osborn's first step to relieve the situation was to reduce sharply the transportation rates on corn to enable the stricken settlers to move their crops to market.¹³ This only partially relieved them and a more radical step was taken. The Illinois Central accepted the farmer's corn at Chicago prices minus transportation charges for payments on their contracts.¹⁴ Such a move was a great help to the farmers whose bins were overflowing with corn due to the abundant harvests of 1860 and 1861 but who had no money to ship the grain to market. It also assured them higher prices since the profit of the middleman was avoided.¹⁵ Circulars were sent to each person owing the Illinois Central for land, and advertisements were inserted in the local papers calling attention to this means of getting the crops to market.¹⁶

Corn began coming in at once in large quantities. Within a month over 50,000 bushels had been received and sold without the loss of a cent, as Osborn reported.¹⁷ So vast became the business that extensive preparations were made to store the corn, miles of cribs being constructed at Burnside for this purpose,¹⁸ and 500 additional grain cars were ordered to be built.¹⁹ The

¹⁰ Chicago Board of Trade, *Annual Report*, 1861, *passim*.

¹¹ Anthony Trollope, *North America* (New York, 1862), 148.

¹² *Annual Reports*, 1861 and 1862.

¹³ *New York Tribune*, June 26, 1861.

¹⁴ *Ibid.*, July 16, 1861.

¹⁵ Osborn to Walker, Dec. 4, 1861 and to Lockwood and Moore, July 1, 1862, in Osborn Letter Book, 1861-1862, M. O.

¹⁶ *Illinois Staats Zeitung*, June 30, 1862.

¹⁷ Osborn to Thomas E. Walker, Aug. 7, 1861, letter book, "Vice Pres. II," green box, 63d Street Archives, Illinois Central Railroad.

¹⁸ *Prairie Farmer*, Nov. 21, 1861; *New York Tribune*, Nov. 26, 1861.

¹⁹ *New York Tribune*, Sept. 23, 1861.

grain, after reaching Chicago, was stored temporarily or transhipped by lake steamers to Buffalo and Oswego where some was disposed of, and the remainder was sent by canal and rail to New York, whence part was exported to Liverpool. More than three million bushels were handled in this way in 1861 and probably a larger amount in 1862.²⁰

The Illinois Central suffered considerable losses in disposing of this grain. On one cargo alone of 100,000 bushels there was a loss of \$45,000.²¹ During the first year the plan was in operation the total losses amounted to \$73,987 and in 1862 to \$32,302.²² The causes of such losses were the generous prices allowed to the settlers, shrinkage, spoiling, unfamiliarity with market conditions and inability to compete with experienced grain dealers. Recognizing these factors, the Company determined to retire from the business of grain collection and sale and, instead, to give to parties owing for land a drawback of 30 per cent on the regular freight charges. According to this plan, the Company would carry the grain to Chicago and there sell it at market prices and credit the settler with the receipts less the reduced transportation charges. The Company assumed all responsibility after the produce was shipped and guaranteed the shipper the highest market price and prompt returns.²³

Shortly after the first experiment with corn was made wheat was also received by the Company in payment for its land, stated prices being guaranteed the farmers for brief periods.²⁴ As this grain was not grown on the Company's lands to the extent that corn was, it did not assume such importance.

It is clear that this method of making collections was a great aid to the distressed farmers in the years 1861 and 1862. They were enabled to get their grain to market, which otherwise might have been impossible in many cases. They were granted a re-

²⁰ President Osborn's report in *Annual Report*, 1862; Douglas to Osborn, Oct. 29, 1861, M. O.

²¹ Osborn to Walker, May 12, 1862, Osborn Letter Book, 1861-1862, M. O.

²² *Annual Report*, 1862.

²³ *Ibid.*

²⁴ See the circular of President Osborn dated Aug. 8, 1861, in M. O.; see also *Illinois Farmer*, VIII (1863), 41, 43.

duction of at least 3 cents per bushel on freight charges and, as the middleman's profit was avoided, they received an addition of 3 or 4 cents in price. The Company's generous policy was highly appreciated by the farmers.²⁵

In the nineteenth century one of the great evils of American agriculture was the one crop system. In the 'fifties and 'sixties its ill effects were particularly noticeable in Illinois. Here many farmers devoted almost all their cultivated land to the production of the two staple crops, corn and wheat. When these crops failed, as happened in 1858, conditions were disastrous. With money scarce, it was difficult for the Illinois Central to collect from its purchasers, as we have seen. Consequently it was natural that President Osborn should turn his attention to the problem of bringing about a more diversified system of farming.

The cultivation of the sugar beet seemed to him to be one means of solving the problem, at least for central and eastern Illinois, and, in 1862, he began a campaign to induce farmers to plant beets instead of corn. He sent copies of a treatise on the sugar beet by John M. Klippart to each member of the State legislature and to many farmers of the State, as well as one hundred copies to the State Agricultural Society for distribution among its members.²⁶ The services of Professor Mott, an authority on the beet sugar industry, were secured to place before the people the desirability of planting beets.²⁷ Osborn made arrangements with the Germania Beet Sugar Company to establish a refinery on a large farm near Chatsworth which he owned personally. Here 1,500 acres were to be placed under beet cultivation as an experimental field.²⁸ The superintendent of the refining company went to Germany where he secured the necessary machinery and 300 mechanics and laborers to operate the plant.²⁹

²⁵ *Illinois Farmer*, VIII (1863), 41, *passim*.

²⁶ Osborn to Hoffman, Feb. 11, 1863, in Osborn Letter Book, 1863-1865, M. O.; *Illinois Farmer*, VIII (1863), 121.

²⁷ Osborn to William Miller, Dec. 1, 1863, in Osborn Letter Book, 1863-1865, M. O.

²⁸ The letter book referred to in the previous note contains a great deal of information on Osborn's activities in promoting the cultivation of beets, cotton, flax, and other such commodities.

²⁹ *Prairie Farmer*, Sept. 15, 1866; Arthur C. Cole, *The Era of the Civil War, 1848-1870* (Springfield, 1919), 381.

With an assured market for the product at good prices, many farmers took advantage of the opportunity offered them and planted beets in place of corn.³⁰

At the same time sorghum culture became popular in Illinois, large quantities of land being devoted to its production, especially along the Chicago branch of the Illinois Central. So important did it become that the sorghum mill was soon as ubiquitous in the Illinois Central towns as the flour mill was in the wheat-growing district.³¹ Osborn also sought to stimulate interest in the cultivation of flax and was successful in inducing many farmers on the branch line to take up flax culture.³²

On his experimental farm at Chatsworth, Osborn endeavored to show the farmers of the region what good management, crop rotation, and the use of fertilizers could do in increasing production and the profits of the soil. He was particularly interested in sheep raising and kept 1,000 sheep on his farm.³³ It is interesting to note that Osborn's colleague and successor, J. M. Douglas, had a similar farm at Nora in northern Illinois. Here he maintained a herd of pure-blooded Shorthorn cattle which he had imported and of which he was extremely proud.³⁴ Both men were very much interested in aiding the farmer and hoped that their example in bringing in good stock and in maintaining model farms would have a good effect upon their neighbors.

President Osborn watched with interest the changes which were taking place in agricultural machinery during the years with which we are dealing. Improved machinery meant that individual farmers could cultivate larger amounts of land and that they would have less idle, unimproved land than was normally the case, since, in the past, farmers had usually bought more land than they could use immediately. Osborn noted in 1864 that whereas a few years previously a small farmer did not ven-

³⁰ *Sectional Maps* (1867), *passim*.

³¹ *Prairie Farmer*, Jan. 5, 1860. The pamphlet literature of the Illinois Central has many references to the beet sugar industry and the sorghum mills.

³² Osborn to Peter Sinclair, June 24, 1864, "President's Letters, 1864," box 48, 63d Street Archives. See also *Sectional Maps*, 5.

³³ Letter as in the preceding note.

³⁴ Douglas to Osborn, Nov. 12, 1866 and March 18, 1867, M. O.

ture to plant more than forty acres, the average being about thirty, now, with improved machines, a man could take care of sixty or seventy acres of land in crops.³⁵ During the Civil War, moreover, when man power was scarce, the agricultural machinery which was developed enabled the North to produce ever increasing amounts of corn and wheat with a diminishing labor supply. This was a source of much relief to President Osborn. The wheat and corn planters and the cultivators which were brought on the market in 1863 and 1864 aided a great deal in replacing the men going to war. The reaper, of course, was not new, but its popularity grew rapidly in this period. The *Prairie Farmer* noted that 33,000 reapers were made for the trade in 1862, 46,000 in 1863, and over 70,000 were planned for 1864. As Illinois was the leading state in wheat production during this period it seems fair to assume that a large number of these reapers was destined for farmers in that State.

Osborn was especially interested in the possibility of harnessing the steam engine to the plow. During the 'fifties, continued improvements had been made upon the plow but the task of breaking the tough prairie sod was still a slow and expensive operation and prevented the small farmer from making rapid improvements on his land. The picture of the heavy breaking plow drawn by slow plodding oxen or by a number of laboring horses is enough to convince one of the difficulties of first bringing the land under cultivation. To encourage experiments with a steam plow, the Illinois Central coöperated with the State Agricultural Society in offering a prize of \$3,000 for the invention and successful operation of a steam-driven plow. J. W. Fawkes, who had already experimented with such a machine, completed a model and took it to Illinois where he exhibited it at Freeport and Chicago. The trials were only partially successful but a tremendous amount of interest was shown in the exhibit and the judges felt justified in awarding a portion of the prize money to Fawkes.³⁶ The Illinois Central subsequently made a generous subscription to a "Steam Plow Manufactory." These efforts,

³⁵ Osborn to Heyworth, June 1, 1864, in Osborn Letter Book, 1863-1865, M. O.

³⁶ *Country Gentleman*, Sept. 22, 1859.

however, led to little result.³⁷ More successful were the prizes offered for a ditching machine, discussed below, and a workable corn cutter and stacker.³⁸

The timely invention and development of practical farm machinery made possible the large-scale farming in Illinois which for a time probably surpassed anything of the kind in the United States. The low price of land in the early 'fifties had enabled men who planned to built up large farms to acquire great tracts of prairie soil. These large farms were most numerous in eastern Illinois, a region which was little settled prior to the coming of the Illinois Central Railroad. By 1870 there were 302 farms of 1,000 acres or more in Illinois, of which 23 were in Vermillion County, 21 in McLean, 10 each in Iroquois, Christian and Champaign Counties, and 9 in Shelby County.³⁹ Over one-half of the total number were in counties in which the Illinois Central had received large amounts of land. In fact many had been bought from the railroad on the generous credit terms it had offered. The first operations of breaking the prairie sod and fencing the land were slow and expensive and prevented most of these owners from carrying their operations far in the 'fifties. In the 'sixties, with better prices, easier credit, and better farm machinery, the era of large-scale farming reached its peak in Illinois. In fact one might almost say that the use of machines first made profitable the large scale farming which was practised by such men as Michael Sullivant, Issac Funk, James N. Brown and others.⁴⁰

President Osborn next turned his attention to southern Illinois. The development and settlement of this section lagged behind that of the rest of the State, a fact which caused the officials of

³⁷ "Journal No. 7," Land Department, 16th Street Archives, Illinois Central Railroad.

³⁸ *Illinois Farmer*, VIII (1863), 154; *Country Gentleman*, Apr. 9, 1863.

³⁹ *Ninth Census* (1870), III, 341 ff.

⁴⁰ *Country Gentleman*, Aug. 13, 1863; *Wisconsin Farmer*, XVIII (1866), 9; *Prairie Farmer*, Sept. 15, 1866; *Harper's Weekly*, Sept. 23, 1871; *Prairie Farmer*, Jan. 3, 1856, quoting letter of James N. Brown of Oct. 29, 1855; James Caird, *Prairie Farming in America with Notes by the Way on Canada and the United States* (New York, 1859), 59-61; *Prairie Farmer*, Jan. 1, July 23, 1857, Feb. 2, June 14, 1860; *Country Gentleman*, Aug. 6, 1863, quoting the *Boston Cultivator*. Also *Ohio Farmer*, Sept. 20, 1913, p. 237-238.

the Illinois Central much concern as the Company owned half a million acres of land there. In the early years of Illinois history this rough timbered area had been the most popular section of the State. By the 'forties, however, settlers were turning more and more to the level prairie lands of northern Illinois. Among the factors which had changed the relative popularity of the two sections were: the inferior soil of the southern section, its reputation as a region in which cholera and malaria were prevalent, the hostility of the old southern upland stock to Yankees and foreigners, the lack of educational facilities, the hot summers, and the unsuitability of much of the land for the cultivation of wheat, the cash crop of the State. During the 'fifties the Illinois Central had directed its attention more towards the sale of its lands suitable for wheat and corn and its advertising literature had been largely concerned with these crops. This policy had further diminished interest in southern Illinois among immigrants and had led to few sales of land in the section. Thus, prior to 1857, the Illinois Central had sold less than 50,000 acres south of Centralia while over 800,000 had been sold north of this town.⁴¹ To arouse interest in southern Illinois and also to stimulate its development, Osborn sought to re-introduce the cultivation of cotton there.

At the opening of the nineteenth century, the early settlers of southern Illinois had raised cotton successfully but the later comers had abandoned it almost entirely.⁴² Under normal conditions the section could not compete with the Gulf States in cotton production, but now, with the South out of the Union and trade with that section cut off, Osborn thought that cotton could be profitably grown in Egypt. He interested prominent men in the production of this crop, notably William H. Seward, sent an agent to Maryland to procure seed, persuaded the federal government to forward through the Patent Office a large supply of seed, and gave wide circulation to an essay on cotton cultivation by an eminent agriculturist.⁴³ In sending out his annual passes to

⁴¹ Computed from the maps in *Sectional Maps* (1857 ed.).

⁴² *Prairie Farmer*, Dec. 26, 1861.

⁴³ Osborn to J. A. Lewis, Dec. 19, 1862; to W. H. Seward, Jan. 3, 1862; to Robertson, Jan. 15, 1862, in Osborn Letter Book, 1861-1862, M. O.

agricultural editors in 1862, he made considerable reference to his efforts to stimulate cotton planting and suggested that the editors publish articles on the possibilities of cotton growing in Illinois.⁴⁴ As a result of this correspondence, wide publicity was obtained for his new project. Practically every prominent agricultural paper in the northern states published more or less material on the subject.⁴⁵

These efforts were successful in arousing much interest as is shown by the comment of an observer in southern Illinois: "We are all in a fever, too, over cotton growing. The Illinois Central Railroad is foremost in fanning the flame to keep up the interests of their Egyptian lands."⁴⁶ A considerable amount of cotton was planted in this section in 1862, one influential farmer preparing 1,000 acres for this purpose.⁴⁷ The yield obtained that year was of course of little commercial importance but, as the result of an experiment, it seemed to promise well for the future. The following year the Illinois Central procured 800 bushels of seed from Memphis and sold it at cost to farmers along its line between Cairo and Centralia. Similarly J. N. A. Griswold, former president of the Company, imported over one and one-half tons of seed for distribution at cost.⁴⁸ Lack of seed had been one of the chief causes for the small amount of cotton planted in 1862, but now, with a more abundant supply, a larger acreage was planted and a substantial yield was expected. This did not prove to be the case, however, for the cotton suffered a severe setback from frosts in mid-season which, in many cases, made picking unprofitable. Not discouraged, the people of southern Illinois planted still larger areas in 1864 and 1865, spurred on in so doing by the high prices then offered. Their efforts in these years were more successful, over 400,000 pounds of

⁴⁴ Osborn to N. J. Coleman, Jan. 15, 1862; to J. H. and Luther Tucker, Jan. 15, 1862, *loc. cit.*

⁴⁵ For examples see *Illinois Farmer*, VII, 6, 40; *Prairie Farmer*, Nov. 15, 1862; *Country Gentleman*, Feb. 6, 1862.

⁴⁶ *Ibid.*

⁴⁷ Osborn to Gen. W. K. Strong, Mar. 27, 1862, in Osborn Letter Book, 1861-1862; *Prairie Farmer*, Nov. 15, 1862.

⁴⁸ *Illinois Farmer*, VIII, 24; *Country Gentleman*, Apr. 23, 1863.

cotton being shipped from the section in 1864 and 1,500,000 in 1865.⁴⁹ With the return of peace, the re-opening of trade with the South, and the consequent fall in the price of cotton, the production of this crop in Illinois, which could only be carried on profitably when prices were high, fell off at once. It amounted to only 465 bales in 1869.⁵⁰ Nevertheless Osborn's work in encouraging the production of cotton in this section was not lost. It had contributed much toward the revived interest in Egypt and had aided in its development.

Osborn's interest in southern Illinois was not limited to cotton production; even more important were his activities to stimulate fruit growing. Most of this section of the State, particularly the Ozark ridge, was admirably adapted to fruit raising and, as the Illinois Central possessed large amounts of land in this region, it sought to hasten its sale by appealing to persons interested in this industry. It published a pamphlet entitled *Illinois Fruit Industry, The Egyptian Basin and Its Contents* and it stressed the apple, peach, and small fruit industries in its advertisements and pamphlets.

The production of fruit was not new in Egypt but hitherto there had been no market for such commodities due to the lack of transportation facilities. The Illinois Central, by connecting the region with Chicago, furnished a market for all available fruit. Furthermore, the road made all reasonable concessions to shippers of perishable commodities. At one time it gave a 33 per cent reduction in the freight tariff on fruit shipped from Egypt to Chicago.⁵¹ This was a great boon to the industry. To expedite the transportation of fruit to Chicago, the Illinois Central put special fruit cars on its passenger trains. The business grew so rapidly that in 1862 it began running two- and three-car specials to Chicago, an innovation which, by 1866, had become an established policy. The train was run for berries and early vegetables for twenty days in June and for peaches, apples and grapes from

⁴⁹ It is stated in *Sectional Maps* (1867 ed.), 5, that 15,000 bales of cotton were shipped from Illinois in 1865.

⁵⁰ *Ninth Census* (1870), III, 132.

⁵¹ *Prairie Farmer*, July 5, 1860, and May 1, 1869.

July 29 to September 29. By the late 'sixties southern Illinois had become an important fruit producing section. In the height of the season ten to twenty carloads of peaches alone were transported daily to Chicago from this section, the total shipments for 1867 being 400,000 boxes to Chicago and 150,000 to St. Louis, besides smaller amounts of other fruits.⁵²

This rapid expansion of the fruit industry led to the formation of the Southern Illinois Fruit Growers' Association whose statistics on fruit growing in this section are worthy of presentation. In 1866 the president of this organization reported the whole number of fruit trees planted in southern Illinois to be 816,375 of which 208,875 were apple, 78,000 were pear, and 439,500 were peach trees. These figures include only the number of trees set out by professional fruit growers.⁵³

As early as 1859 excellent profits were reported from this growing business, accounts of which were widely published in agricultural papers, no doubt with some exaggeration. The experience of the Evans brothers is a good example. They were reported to have sold 8,000 baskets of peaches at an average price of \$2 per basket in 1860. The net return was said to be well over \$12,000, all from a farm which they had purchased the summer before from a rebel sympathizer for \$10,000.⁵⁴ Somewhat later the Winter brothers of Du Quoin expected to market 20,000 boxes of peaches on which they hoped to reap quite a fortune.⁵⁵ So profitable did the growing industry promise to be that, according to one observer, fruit raising became "a mania."⁵⁶ One man in Washington County set out 3,500 fruit trees in 1859 and 1860, another in Union County set out 2,000 apple, 3,000 peach, 200 pear and 100

⁵² Report of Dr. Meeker in *Illinois Farmer*, VII, 298-299; *Illinois Central Magazine*, XV (1926), 16.

⁵³ There is considerable material on the fruit industry in Illinois in the 'sixties in the *Transactions* of the Illinois State Agricultural Society for 1865-1870 and in the *Annual Reports* of the U. S. Commissioners of Agriculture for the same years. See also *Sectional Maps*, *passim*.

⁵⁴ *Illinois Farmer*, VII, 279.

⁵⁵ *Prairie Farmer*, Aug. 4, 1866.

⁵⁶ A. Babcock in *Country Gentleman*, Mar. 27, 1862.

cherry trees and 2,500 grape vines. Three years later orchards of 20,000 trees were common.⁵⁷

The production of small fruits and vegetables was also becoming important in southern Illinois. Within two years after the region was connected with Chicago a farmer in Anna was shipping quantities of tomatoes there—50 bushels on July 25, 1857—which brought as high as \$10 per bushel.⁵⁸ Truck gardening and the production of strawberries and other small fruits for the Chicago market continued to progress. In 1867 14,000 bushels of small fruit were grown in southern Illinois, of which Chicago received 12,500. In the same year 6,775 bushels of vegetables were shipped over the Illinois Central from stations in this region.⁵⁹

The Illinois Central made changes in its advertising pamphlets and cuts to make them conform to the new interest it was showing in its southern lands. Cotton, tobacco, and fruit were given attention and to the enticing cuts, hitherto picturing only corn, wheat, cattle and hogs were added fine specimens of growing cotton and ripe fruit. The stimulus given to cotton and fruit growing in the southern part of the State revived immigration into that section and henceforth it received a larger share of the incoming settlers than it had been receiving in the early 'fifties. There was another section of the State which had been neglected and to which Osborn also turned his attention, eastern Illinois.

Eastern Illinois from Lake Michigan southward suffered from a number of handicaps which retarded its growth in the 'fifties and 'sixties. In the first place it was more poorly supplied with means of transportation than any other section of the State except Egypt. The Illinois Central was its only north-south line. In the course of its two hundred and fifty miles, the road was crossed by five east-west railroads. Considerable quantities of land in the region lay ten to twenty-five miles from a railroad and, as there were practically no navigable rivers to supplement the railroads, the situation for development was not the best.

⁵⁷ *Illinois Farmer*, VII, 101-144, 298-299; *American Agriculturist*, Sept. 1863, p. 262; *New England Farmer*, I (1867), 469.

⁵⁸ *Prairie Farmer*, July 30, 1857.

⁵⁹ See the references cited in footnote 57.

Furthermore, on account of poor drainage the dirt roads were impassable for weeks at a time. The second and most important factor which retarded the development of eastern Illinois after the railroad was built was its lack of drainage facilities. The low relief, the sluggish streams, and the flat prairies of Champaign, Iroquois, and Kankakee Counties combined, made large areas of rich land of little use until they could be artificially drained. The federal government had attempted to assist the western states in draining such areas by granting the swamp and overflowed lands to the states in which they were located. Under the Swamp Land Act of 1850 Illinois had received one and a half million acres of such land but the State granted them to the counties which dissipated them in one way or another without providing for their drainage.⁶⁰

The Illinois Central did not feel the necessity of draining its wet lands until the late 'fifties because it possessed sufficient dry land in central and eastern Illinois to meet the demands of incoming settlers. By 1859, however, when most of the dry lands had been taken up, attention was turned to the wet areas. The officials of the land department realized that settlers could do little with such lands until they were drained. To secure a practical ditching machine they offered a prize of \$250 for the implement which would best meet the needs of the region.⁶¹ The prize was awarded and a model of the machine was set up in the office of the land department.⁶² This was helpful, but only the large land owners could afford such expensive machines and consequently the problem of draining the wet areas was not solved. Osborn then induced the Illinois Central to undertake drainage in regions where it possessed considerable bodies of land and a large sum was expended in 1863 in this work.⁶³ Somewhat later the Company coöperated with Solomon Sturges, one

⁶⁰ See the present writer's "Disposal of the Public Domain in Illinois, 1848-1856," in *Journal of Economic and Business History*, III (1931), 219.

⁶¹ *Illinois Farmer*, VIII, 154; *Country Gentleman*, Apr. 9, 1863.

⁶² Osborn to W. M. Phillips, Oct. 17, 1863, in the letter book, "Presidents' and Chairmen's Letters, No. 18," box 48, 63d Street Archives.

⁶³ Illinois Central Railroad, *Annual Report*, 1863.

of the largest land owners in the State, in draining a tract of wet lands between Gilman and Danforth. Here over fifty miles of ditching was dug and a considerable area of land made available for farming. Equally successful was the work of A. H. and G. W. Danforth who owned over 17,000 acres of land in the region between Ashkum and Gilman. They bought from the Illinois Central 10,000 additional acres at the minimum price, thus acquiring a large tract of land, most of which needed draining. The Illinois Central established a station near the Danforths' lands to facilitate shipping and receiving of goods and aided them in bringing in new settlers. The Danforths purchased a ditching machine and with the aid of the new immigrants soon cut over twenty-five miles of ditches and succeeded in draining a large amount of land, some of which had been constantly covered with water.⁶⁴ Their success served to stimulate others in the neighborhood to undertake similar activities. Thus, thanks to the efforts of the Illinois Central and of private persons who coöperated with them, large areas were made available for agriculture.

President Osborn was most adept in the art of securing publicity for the activities of the Illinois Central in promoting agriculture. He furnished the editors of the main agricultural papers with passes to enable them to travel freely over the line of the road. When sending them these passes he would call their attention to some particular work which the Company was doing to promote agriculture and would suggest that they publish articles on these activities. He supplied them with information in the nature of pamphlets and reports of speeches and filled his own letters to them with discussions of his policies.⁶⁵ The columns of the *Prairie Farmer*, the *Illinois Farmer*, the *Wisconsin Farmer*, the *Valley Farmer*, and of such eastern periodicals as the *American Agriculturist* and the *Country Gentleman* were filled with items concerning the work of the Illinois Central in helping to promote the state fairs, in establishing the sugar beet

⁶⁴ *Prairie Farmer*, Sept. 15, 1866.

⁶⁵ Osborn to J. H. and Luther Tucker, editors of the *Country Gentleman*, Jan. 15, 1862; Osborn to N. J. Coleman, editor of the *Valley Farmer*, Jan. 15, 1862, in Osborn Letter Book, 1861-1862, M. O.

industry, in encouraging the growth of cotton and the production of fruit in southern Illinois, in stimulating the invention of farm machinery, in draining the wet lands, and in assisting its delinquent debtors to meet the payments on their land. Information concerning these activities was of course most valuable to the farmers of Illinois. Osborn was particularly successful in getting M. L. Dunlap, editor of the *Illinois Farmer* and contributing editor to the *Chicago Press and Tribune* (later the *Tribune*) to publish items concerning his agricultural promotion work, knowledge of which was thus widely disseminated among the people of the State. Dunlap was a farmer himself and could well appreciate the value of Osborn's work and he was ready to assist him in any way possible.

The activities of the Illinois Central in popularizing the State, in stimulating immigration, in aiding agriculture, in developing markets, together with the high prices for agricultural products, the development and extensive use of farm machinery, and the large scale farming by capitalist farmers, led to a large increase in the number of farms and the amount of land under cultivation. Thus in the decade of the 'fifties, 67,000 new farms were opened up in the State and 8,000,000 acres were first brought under cultivation; in the 'sixties the figures were 59,000 and 6,200,000 respectively.⁶⁶

This great expansion of agriculture made Illinois the chief corn and wheat producing state in the union, provided the north with a surplus of grain for export and thereby aided greatly in the successful outcome of the Civil War. The corn crop increased from 115,000,000 bushels in 1859 to 201,000,000 in 1870. As this grain was not readily marketable, and in proportion to its bulk brought much less than wheat, the farmers found it more profitable to feed it to cattle and to hogs than to ship it to market. This resulted in a proportionate though slower increase in the number of cattle and hogs in Illinois. By 1870 this State had definitely taken the lead in hog production and was second only to Texas in the beef cattle industry. The production of wheat

⁶⁶ Taken from the *Census Reports*, 1850, 1860, and 1870.

jumped from 24,000,000 bushels in 1860 to 33,000,000 in 1864,⁶⁷ the banner year for Illinois agriculture. In this year the State raised one-fifth of the entire wheat crop of the country. The significance of this rapid expansion of wheat production has been pointed out elsewhere. With bountiful crops in America, England was suffering from poor harvests and depended more and more on its imports from the United States. This marked the beginning of the great outpouring of American agricultural produce to Europe which has made such marked changes in the economic life of many of the European countries. The Illinois Central had played an important part in the rapid agricultural development of Illinois and, even more, it had laid down the general lines of a policy which was to be followed by other land grant railroads and eventually by most of the western railroads, of diversifying and improving agriculture. To President Osborn belongs much of the credit for initiating this type of activity.

⁶⁷ Statistics taken from the *Census Reports* for 1860 and 1870 and the *Annual Reports* of the U. S. Commissioner of Agriculture for 1864 through 1870.

NEWS NOTES AND COMMENTS

FOURTEENTH ANNUAL MEETING OF THE AGRICULTURAL HISTORY SOCIETY

Thirty-four were present at the dinner and forty at the fourteenth annual business meeting and program of the Agricultural History Society, held at the Cosmos Club in Washington, D. C., on May 6, 1931. The society's president, Avery O. Craven, presided.

The nominating committee consisting of Solon J. Buck (chairman), Nils A. Olsen, and Earle D. Ross, having mailed ballots to members of the society, reported the following elected for the year 1931-32: for president, Joseph Schafer, State Historical Society of Wisconsin; for vice-president, W. Freeman Galpin, Syracuse University; for secretary-treasurer, O. C. Stine, U. S. Department of Agriculture; and elected members of the executive committee, L. C. Gray and L. C. Corbett, both of the U. S. Department of Agriculture.

Preceding the literary program proper, Dr. Edmund C. Burnett of the Carnegie Institution of Washington gave a satirical skit on *The Old Rail Fence*. The literary program consisted of two interesting and valuable papers. Dr. A. G. McCall, chief, in charge of soil investigations, U. S. Bureau of Chemistry and Soils, spoke on *The Development of Soil Science*; his paper appears elsewhere in this issue of *Agricultural History*. The subject of Professor Avery O. Craven's presidential address was Edmund Ruffin, Farmer.

In his treatment of Edmund Ruffin, Professor Craven sketched his subject on a broad canvas and interpreted it in terms of the struggle between agriculture and industry, and in relation to the westward movement. In doing so, he carefully utilized the significance of the fact that Edmund Ruffin fired the first shot

at Fort Sumter and that he took his own life following the surrender of Lee as he saw the hope of a Confederate States of America fade away forever. Considerable attention was also given to Ruffin as a pioneer in agricultural science. His unsuccessful attempt to apply on his own estate the methods of soil improvement advocated by John Taylor of Carolina in his *Arator*, issued in 1813, led Ruffin to experiment with the effect of calcareous manures on soils,—probably his most notable contribution to agriculture. Certain passages in Sir Humphrey Davies' *Lectures on Agricultural Chemistry* led him to try eliminating soil acidity by applying calcareous materials. The first account of these experiments appeared as "An Essay on Calcareous Manures" in the *American Farmer* in 1821. Later this essay appeared in book form, a fifth edition being issued in 1852. Professor Craven also gave attention to Ruffin's monthly agricultural journal, the *Farmers' Register*, published from 1833 to 1842, and his scattered essays, published collectively in 1855 under the title *Essays and Notes on Agriculture*. Ruffin's conviction of the necessity of better education for farmers and his interest in the Virginia State Agricultural Society and the Virginia State Board of Agriculture were more summarily treated. It is hoped that the Agricultural History Society will have the privilege of printing this brilliant address in *Agricultural History*.

The society's secretary-treasurer, O. C. Stine, reported forty-seven new members since the last meeting but a net gain of only seventeen as thirty names were dropped from the roll. He also announced the recent addition of a life membership from the Philadelphia Society for Promoting Agriculture. The total membership is now 340.

The auditing committee, consisting of F. L. Lewton (chairman), Marjorie Warner, and Claribel R. Barnett, reported that it had audited and approved the report of the secretary-treasurer covering the period March 29, 1930 to April 25, 1931.

SECRETARY-TREASURER'S REPORT OF RECEIPTS AND EXPENDITURES

March 29, 1930, to April 25, 1931

RECEIPTS

Balance in checking account on March 29, 1930.....		\$1.58
Dues for 1927, 1928, 1929, 1930, 1931 and 1932 paid since last meeting:		
140 for 1930.....	\$420.00	
177 for 1931.....	531.00	
17 for 1927, 1928, 1929.....	34.00	
2 for 1932.....	6.00	
	<hr/>	
	\$991.00	991.00
Life membership, Philadelphia Society for Promoting Agriculture, April, 1931.....		100.00
Back numbers of JOURNAL and Papers sold to members and others since March 29, 1930.....		150.25
		<hr/>
		\$1,242.83

EXPENDITURES

Printing and other expenses incidental to publishing the four numbers of the JOURNAL for 1930 and the number for January, 1931.....	\$913.80
Mimeograph work.....	32.70
Express, delivery, telephone and special mailing of JOURNAL.....	3.60
Stamps for mailing circular letters, notices of meetings, dues, pro- grams, back issues of JOURNAL, etc.,.....	64.00
Reprinting of no. 1 of vol. I of the JOURNAL.....	40.00
Reprints of E. S. Osgood's article.....	6.16
9 copies of vol. I of Papers bought from the U. S. Govt. Printing Office by E. E. Edwards.....	5.85
	<hr/>
	\$1,066.11
Total receipts.....	\$1,242.83
Total expenditures.....	1,066.11
	<hr/>
In checking account on April 25, 1931.....	\$176.72

AGRICULTURAL HISTORY SOCIETY PAPERS

During 1921-1925 the Agricultural History Society published three volumes of *Agricultural History Society Papers* in coöperation with the American Historical Association as part of its annual reports. These volumes were distributed separately by the society to persons who were members at that time.

Volume one contains the following articles: A Brief History of the Sheep Industry in the United States, by L. G. Connor;

Dr. John Mitchell, Naturalist, Cartographer, and Historian, by Lyman Carrier; Historical Aspects of the Surplus Food Production of the United States, 1862-1902, by William Trimble; Early Days of the Albermarle (Va.) Agricultural Society, by Rodney H. True; Minute Book of the Albermarle Agricultural Society, prepared for publication by Rodney H. True.

Volume two contains the following articles: Possibilities of Intensive Research in Agricultural History, by R. W. Kelsey; Some Features of Tobacco History, by George K. Holmes; Notes on the Agricultural History of Maize, by G. M. Collins; The Earliest American Book on Kitchen Gardening, by Marjorie Fleming Warner; An Early Agricultural Periodical, by Mary G. Lacy.

Volume three contains the following articles: Description and Travel as Source Material for the History of Early Agriculture in Pennsylvania, by Rayner W. Kelsey; The Early Development of Agricultural Societies in the United States, by Rodney H. True; History of the Range Cattle Industry in Oklahoma, by Edward Everett Dale.

Copies of volumes 2 and 3 are available from the Agricultural History Society, Room 304, 1358 B. Street, S.W., Washington, D. C., at fifty cents per copy. The society is willing to undertake to secure copies of volume 1 from the United States Government Printing Office at seventy-five cents.

AGRICULTURAL HISTORY BIBLIOGRAPHY

The Oberly Memorial Prize, administered by the American Library Association and offered biennially for the best bibliography in the field of agriculture or the related sciences has been awarded to Everett E. Edwards by unanimous vote of the committee of judges for his bibliography entitled *A Bibliography of the History of Agriculture in the United States*. Copies of this bibliography, issued by the United States Department of Agriculture as its *Miscellaneous Publication No. 84*, are available by addressing the compiler or the United States Government Printing Office.

HISTORY OF APPLIED ENTOMOLOGY

Dr. L. O. Howard's *A History of Applied Entomology (Somewhat Anecdotal)* has been published by the Smithsonian Institution as its Miscellaneous Collections, v. 84. It is divided into seven parts: (1) North America; (2) Europe; (3) Asia; (4) Africa; (5) Australia and the Pacific; (6) South and Central America and the West Indies; (7) Medical entomology and the international use of parasites. It contains many personal reminiscences of the author's contacts with eminent entomologists, evaluations of their works, and many observations on changing conditions.

GEOGRAPHICAL ARTICLES

Economic Geography for January, 1931, includes the following articles: The Mesilla valley of New Mexico: A Study in Aridity and Irrigation, by Edwin J. Foscue; Land Utilization in the Scablands of Eastern Washington, by Otis W. Freeman; Geographic Regions of Sierra Leone, by G. T. Renner; Peanuts: Prices, Production, and Foreign Trade Since the Civil War, by Arthur G. Peterson; The Gulf Port City Region of Texas, by William T. Chambers; and Chicory: Michigan's Infant Monopoly Crop, by Floyd A. Stilgenbauer.

The valuable study of the "Economic Geography of the Gray-Brownerths of the Eastern United States" by Louis A. Wolfanger in the *Geographical Review* for April, 1931, is the first of a series under preparation on the geography of the great soil groups of the United States and their chief subgroups.

BOOKS AND ARTICLES

A Systematic Source Book of Rural Sociology (Minneapolis, Univ. Minnesota Press, 1930), edited by Pitirim A. Sorokin, professor of sociology, Harvard University, Carle C. Zimmerman, associate professor of sociology, University of Minnesota, and Charles J. Galpin, of the United States Department of Agriculture has been issued as the first of three volumes which aim through introductions, digests, selections, and tables to give a systematic treatment of the theories and conclusions of scientific men on the

subject. This volume includes material on the history of rural sociological theory, the characteristics of the farmer-peasant class from the ancient Orient to the end of the eighteenth century, and the details of social organization in rural communities. The need of comparative study is emphasized.

In his interesting article on "The Early History of Felt" in the *American Anthropologist* for January-March, 1930, Berthold Laufer states that the art of rolling, beating, or pressing animal hair or wool is probably older than the art of spinning or weaving and that it was restricted in antiquity to Europe and Asia. The art was invented and perfected by Asiatic nomads.

The illustrated article by P. Wolters entitled "Gestalt und Sinn der Ähre in Antiker Kunst" in the fourth number of *Antike* for 1930 (v. 6, p. 284-301) is an explanation of the form and meaning of the ears of corn as represented in ancient art.

In his article on "Antique Fig-beads" in the *American Journal of Archaeology* for April-June, 1930, Gustavus A. Eisen states that the occurrence of fig-beads in Italian tombs of the 9th and 8th centuries B. C. strengthens the theory that the fruit was imported from the east at that time.

G. Albin's "Billiard: 'L'Agriculture dans l'Antiquité d'après les Géorgiques de Virgile'" in *Gnomon* for June, 1930, is a review of Billiard's *Agriculture in Antiquity According to the "Georgics" of Virgil*.

Elizabeth Grier's article on "Lucius Julius Serenus, an Egyptian Landowner of the Second Century after Christ" appears in the *Classical Philology* for January, 1929.

An article by H. A. Thompson on "Syrian Wheat in Hellenistic Egypt" appears in *Archiv für Papyrusforschung und Verwandte Gebiete* for 1930 (v. 9, no. 3-4, p. 207-213).

Matthias Murko's "Zur Geschichte der Heugabel" in *Wörter und Sachen* for 1929 (v. 12, no. 2, p. 316-341) is a study of the origin and uses of various materials for tools and artifacts in agriculture in Bosnia.

In view of the great drought in the United States in 1930 and the months following, the article by Professor H. S. Lucas on "The Great European Famine of 1315, 1316, and 1317" in *Speculum* for October, 1930, is of interest. The excessive rains of 1315 ruined the harvests and as a result famine and pestilence followed. From November, 1315, to June, 1316, prices of corn in Antwerp rose 320 per cent.

W. H. Beveridge's "The Yield and Price of Corn in the Middle Ages" appeared in *Economic History: A Supplement to the Economic Journal* for May, 1927.

The March, 1931, issue of the *Country Gentleman* has appeared under the title *Historical Number, 1831-1931, The Country Gentleman* on the occasion of the one hundredth anniversary of the publication. On the inside cover and the recto of the preliminary leaf, there is a picture map of the United States of 1831, the date when the *Country Gentleman* first made its appearance as the *Genesee Farmer*, published at Rochester, N. Y., by Luther Tucker. Among the historical articles in the number are the following: The First Hundred Years, by E. H. Taylor; And Then Came Power: The Machine Age in Farming and the Mighty Changes It has Brought, by Gove Hambridge; Cyrus Hall McCormick, by Cyrus McCormick, Jr.; and The Men Who Remade Agriculture, by J. Sidney Cates.

The question of which is the oldest agricultural journal in America is considered under the title "Old American Agricultural Journals and an Old Controversy" in *Agricultural Library Notes* for February, 1931.

The proposals to provide legal protection for the originators or holders of new horticultural varieties is traced by Magdalene

R. Newman in an article entitled "Plant Patents: A Brief Historical Survey, with References" in *Agricultural Library Notes* for February, 1931.

Bibliography of Commander Matthew Fontaine Maury, Including a Bibliographical Sketch, by Ralph Minthorne Brown and issued by the Virginia Polytechnic Institute as its Bulletin, vol. 24, no. 2, is of interest to agricultural historians because of the pioneer work of Commander Maury in getting farmers and others to coöperate in making systematic reports of temperature, winds, and conditions and yields of crops. As a result of his efforts over twenty years Congress established in October, 1871 a "telegraphic meteorological bureau," the forerunner of the United States Weather Bureau and the Division of Crop and Livestock Estimates of the United States Bureau of Agricultural Economics.

"Lincoln's Attitude Toward Farm Problems" is the title of a radio talk by Everett E. Edwards, delivered through WRC and 39 other stations associated with the National Broadcasting Company on February 12, 1931. Copies may be secured by addressing the Division of Economic Information, U. S. Bureau of Agricultural Economics. This talk also appears as an article with bibliographical references in *Agricultural Library Notes* for February, 1931.

The correspondence of Justin S. Morrill for the period between 1867 and 1897 has been acquired by the Baker Library of the Harvard Graduate School of Business Administration through the courtesy of John Spargo, president of the Vermont Historical Society. Announcement of this acquisition is made in a short article entitled "Twenty Years of Tariff Manipulation" in the *Bulletin of the Business History Society* for February, 1931. The article includes excerpts from the correspondence.

Tercentenary of New England Agriculture (Springfield, Mass., Printed by Phelps Publishing Co., 1930. 82 p., illus.), published by the Commissioners of Agriculture of the six New England

States, contains about thirty articles of interest to students of agricultural history.

A. E. Stene's "Some Phases of Apple Growing in Rhode Island," issued by the Rhode Island Agricultural Experiment Station as its *Bulletin 226* contains an interesting historical introduction.

A History of the Pennsylvania Horticultural Society, 1827-1927 (Philadelphia, 1929), by James Boyd, twentieth president, has recently been issued by the Society.

An interesting article by George F. Johnson on "Silk and Farm" appears in the *Pennsylvania Farmer* for March 14, 1931. The same number has an article signed by A. C. S., on "The Birth-place of an Industry," the industry considered being the McCormick reaper.

A second edition of *The Conestoga Six-horse Bell Teams* (Cincinnati, Ebbert & Richardson Co., 1930) has recently been published by John Omwake for private distribution. The twenty-seven-page Appendix to Second Edition has many additional facts and illustrations.

Volume 31-32 of the *Records* of the Columbia Historical Society includes an illustrated account of the "Old Mills in the District of Columbia" and its neighborhood by Allen C. Clark.

Announcement has been received of the forthcoming private publication of the *Virginia Historical Guide*, an index to the remarkable series of original letters, extracts from county and State archives, exhaustive historical studies, biographical sketches, geographical notes and family histories, and other materials in the *Virginia Magazine of History and Biography*, the *William and Mary College Quarterly Historical Magazine* (1st and 2nd series), *Tyler's Historical and Genealogical Quarterly*, *Virginia Historical Register*, *Lower Norfolk County Antiquary*, *Calendar of Virginia*

State Papers, and *Hening's Statutes of Virginia* (1619-1792), by E. G. Swem, librarian of the College of William and Mary in Virginia.

A brief article by Donald R. Murphy on "How McCormick Won a War" appears in *Wallaces' Farmer and Iowa Homestead* for March 7, 1931.

An article by Dr. Gus W. Dyer on "'Old Virginia Never Tires;' Cyrus Hall McCormick" appears in the *Southern Agriculturist* for March, 1931.

An article by Spalding Trafton on "Silk Culture in Henderson County, Kentucky" appears in the *Filson Club Historical Quarterly* for October, 1930.

Rosser H. Taylor's paper on "Commercial Fertilizers in South Carolina," read at the joint meeting of the American Historical Association and the Agricultural History Society at Durham, North Carolina, in December, 1929, is printed in the *South Atlantic Quarterly* for April, 1930.

An announcement that sugar-cane in Florida is being harvested by machinery on a commercial basis for the first time in history is presented under the title, "Mechanical Harvester perfected for Sugar-Cane Cutting," in the *Monthly Labor Review* for March, 1931. It is based on a press statement in the *Pittsburgh Press* for January 26, 1931.

In his *The Development of the Federal Program of Flood Control on the Mississippi River* (New York, Columbia Univ. Press, 1930), Arthur De Witt Frank gives a history of the efforts of the federal government to safeguard the riparian lands along the lower Mississippi.

A valuable article by Charles T. Leavitt on "Some Economic Aspects of the Western Meat-Packing Industry, 1830-60" ap-

pears in the *Journal of Business of the University of Chicago* for January, 1931. It is part of a doctor's dissertation which the author is completing as a graduate student in history at the University of Chicago.

An extensive note on the first planting of alfalfa in Michigan is given in the Summer number of the *Michigan History Magazine* for 1929. See p. 588-590.

A valuable article by Paul Wallace Gates on "The Disposal of the Public Domain in Illinois, 1848-1856" is included in the *Journal of Economic and Business History* for February, 1931. It is part of a doctor's dissertation submitted at Harvard University in 1930.

"Memoirs of Mary D. Bradford" in the *Wisconsin Magazine of History* for September, 1930, is a story of farm life in Wisconsin during the 1850's.

"A New Yorker in the Great West, 1867" in *Minnesota History* for March, 1931, consists of excerpts from the diary of C. N. Brainerd, preceded by an editorial note by Bertha L. Heilborn. The diary was published as a closely printed booklet of 45 pages in 1868 under the title *My Diary: Or Three Weeks on the Wing; A Peep at the Great West*. Unlike the ordinary tourists of the period he left the river at Winona and penetrated the newly settled area of southern Minnesota until he reached a prairie farm in Martin County.

"A Norwegian-American Landnamsman: Ole S. Gjerset" by Knut Gjerset in the *Studies and Records* of the Norwegian-American Historical Association for 1928 (v. 3, p. 82-100) is an account of an immigrant from Romsdal, Norway, who came to America in 1871 and settled in western Minnesota.

"Emigration as Viewed by a Norwegian Student of Agriculture in 1850: A. Budde's 'From a Letter about America,' " translated

by A. Sophie Bøe and with an introduction by Theodore C. Blegen is printed in the *Studies and Records* of the Norwegian-American Historical Association for 1928 (v. 3, p. 43-57). In 1850, Jan Adolph Budde, the director of an agricultural school at Stavanger, Norway, published a tract against immigration. In it he argued that since a Norwegian would have to change his agricultural methods if he went to America, he might with equal advantage modernize his methods and stay at home.

About one-half of the article by O. J. Felton on "Pioneer Life in Jones County" in the *Iowa Journal of History and Politics* for April, 1931, is on farming conditions in Jones County, Iowa, beginning about 1855.

S. J. Cook's "Gold Camps and the Economic Development of Western Montana" in the *Journal of Political Economy* for October, 1930, has material on the way the mines afforded a market for the agricultural output of the first farmers.

T. J. Cauley's article on "Agricultural Land Tenure in Texas" in the *Southwestern Political and Social Science Quarterly* for September, 1930, affords information on farm tenure in Texas since 1880.

F. D'Arcy's "Les Débuts du Cacao des Iles" in *Revue Histoire des Antilles* for January-March, 1930, is an account of the beginnings of cacao cultivation in the French West Indies from around 1660 to 1785.

Oscar Schneider's *Alteration of the Argentina Pampa in the Colonial Period* (Berkeley, Calif., Univ. Calif. Press, 1927), issued as California University Publications in Geography, v. 2, no. 10, is a study of Spanish colonization in the Pampa region of Argentina, with emphasis on the development of the land system.

E. A. Kosminsky's "The Hundred Rolls of 1279-80 as a Source for English Agrarian History" appears in the *English Historical Review* for January, 1931.

An interesting article by Sir Alfred E. Pease entitled "Observations on 'Blackface Sheep.' Their Origin and History" appears in the Yorkshire Agricultural Society *Transactions* for 1929 (v. 87, p. 5-22).

A short article by Barbara Hammond on "Two Towns' Enclosures" is included in *Economic History; A Supplement of the Economic Journal*, for January, 1931. It pertains to enclosures in Sheffield and Lambeth at the end of the eighteenth and nineteenth centuries.

Two articles by G. E. Fussell of the Great Britain Ministry of Agriculture and Fisheries were printed in *Agricultural History* in the issues for October, 1929 and October, 1930. Reference was made in the number for October, 1930, to three of his articles published elsewhere. Students of agricultural history will also be interested in his *Chronological List of Early Agricultural Works in the Library of the Ministry of Agriculture and Fisheries* (London, H.M. Stationery Office, 1930. 43 p.). His "The Change in Farm Labourers' Diet During Two Centuries" appeared in *Economic History; A Supplement of the Economic Journal* for May, 1927. His "The London Cheesemongers of the Eighteenth Century" is in issue of the same journal for January, 1928.

R. C. Punnett's *Notes on Old Poultry Books* (London, "The Feathered World," 1930) contains historical material of interest and also a bibliography of poultry books to 1880, by E. Comyns Lewer and the Author.

Sir Edward Brown's *British Poultry Husbandry; Its Evolution and History* has been published by Chapman & Hall's (London, 1930).

John E. Pomfret's *The Struggle for Land in Ireland, 1800-1923* (Princeton, Princeton Univ. Press, 1930) is reviewed by James F. Kenney in the *American Historical Review*, for January, 1931.

Paul Raveau's "Essai sur la Situation Economique et l'État Social en Poitou au XVI^e Siècle" appears in the *Revue d'Histoire Économique et Sociale* for 1930 (v. 18, no. 2, p. 164-183).

Abbott Payson Usher's study of "The General Course of Wheat Prices in France: 1750-1788," undertaken in order to test the value of the results of the investigations made by Vicomte d'Avenel, appears in the *Review of Economic Statistics* for November, 1930.

"La Lutte pour l'Individualisme Agraire dans la France du XVIII^e Siècle. I. L'Oeuvre des Pouvoirs d'Ancien Régime," by Marc Bloch, appeared in the *Annales d'Histoire Économique et Sociale* for July 15, 1930.

"Organization and Activity of the Swiss Peasant's Union" in the *International Review of Agriculture* for March, 1929, is a brief consideration of the Swiss Peasants' Union founded in 1897 as a result of the severe agricultural depression in the last half of the 19th century.

A. W. Trumpf's "Genossenschaftlicher Schlachtviehabsatz der Zentralgenossenschaft für Viehverwertung e. G. m. b. H., Hanover" in *Berichte über Landwirtschaft* for 1929 (n. f., bd. 10, hft. 3, p. 426-442) considers the development of the Central Coöperative Cattle Marketing Organization of Hanover during the last thirty years.

Oskar Groundstroem's "Lantbruket i Tyskland under Världskriget" in *Ekonomiska Samsfundets Tidskrift* for 1929 (p. 28-69) is a consideration of German Agriculture during the World War.

A. Richter's "Beiträge zur Geschichte des Deutschen Forstwesens" in *Zeitschrift für Forst- und Jagdwesen* for May, 1930, is of interest.

J. Frost's "Landwirtschaftliches Siedlungswesen in Schweden" in *Berichte über Landwirtschaft* for 1929 (n.f., bd. 10, hft. 3, p. 443-449) gives a summary of Sweden's land policy since the sixteenth century.

Elna Mygdal's article on "Danish Kinsmen of Father Knickerbocker: The Amagar Colony at Copenhagen" in the *American Scandinavian Review* for December, 1930, gives an account of the Dutch colony of gardeners and dairymen who settled sometime before 1521 on Amagar Island, Denmark.

Olindo Gorni's article on "Land Reform in Rumania" in the *International Labour Review* for October, 1930, is one of a series devoted to European land reform.

A. Tchayanov's article on "The Organization and Development of Agricultural Economics in Russia," appears in the *Journal of Farm Economics* for April, 1930.

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three volumes, is a somewhat abridged English version of the author's eight volume work brought out in 1920 under the title *Nihon Keizai Shi* (economic history of Japan). The English edition is reviewed by K. Asakawa in the *American Historical Review* for April, 1931.

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